

(19)



(11)

**EP 3 228 532 B1**

(12)

**EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention  
of the grant of the patent:  
**06.05.2020 Bulletin 2020/19**

(51) Int Cl.:  
**B63J 4/00** <sup>(2006.01)</sup>

(21) Application number: **16163894.5**

(22) Date of filing: **05.04.2016**

**(54) BALLAST WATER TREATMENT OPERATING APPARATUS AND METHOD**

BALLASTWASSERBEHANDLUNGBETRIEBSVORRICHTUNG UND -VERFAHREN

APPAREIL DE COMMANDE DE TRAITEMENT D'EAU DE BALLAST ET PROCÉDÉ

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB  
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO  
PL PT RO RS SE SI SK SM TR**

(43) Date of publication of application:  
**11.10.2017 Bulletin 2017/41**

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## Description

### BACKGROUND OF THE INVENTION

#### Field of the Invention

**[0001]** The present invention relates to a ballast water treatment operating apparatus and method and particularly to a ballast water treatment operating apparatus and method for determining whether to operate a ballast water treatment by using positional information of a global positioning system (GPS).

#### Description of the Related Art

**[0002]** Ships carrying cargo at sea in most cases sail in the state of a full load of cargo thereof and then unload cargo, and come back again with empty load. In case ships return with empty load like this, they start sailing after filled with ballast water by introducing it into the inside of the ships for the ship's balance, stability, manoeuvrability improvement and the like.

**[0003]** At this time, ballast water is filled in one port by means of the ballasting operation, then transferred to another port and discharged in the new port by means of the deballasting operation. Like this, as ballast water containing marine organisms and pathogens which is transferred from a long distance away is discharged, such a discharge may cause adverse effects disturbing the marine environment and ecosystem. Thus, the International Maritime Organism (IMO) has recently enacted the ballast water treatment regulation to prevent the disturbance of the environment and ecosystem.

**[0004]** To remove danger caused by marine organisms and pathogens, ballast water treatment devices which electrolyze ballast water or sterilize it by injecting chemicals or by ultraviolet light, are generally used in ships. However, since ballast water entered into the ballast water tank or discharged from the ballast water tank is of a large capacity, the high power consumption is caused whenever such a treatment is done.

**[0005]** Following documents are known in this technical field : DE 10 2006 045 558 A1, EP 2 913 305 A1, KR 101 486 501 B1, US 2003/176971 A1, EP 2 977 355 A1 and KR 2015 0109 309 A.

### SUMMARY OF THE INVENTION

**[0006]** To solve the above mentioned problem, the present invention has an object to provide a ballast water treatment operating apparatus and method which determine whether to operate a ballast water treatment by using positional information of GPS.

**[0007]** So as to obtain the object described above, a ballast water treatment operating apparatus according to one embodiment of the present invention may comprise: a ballast water treatment unit for performing a certain treatment of a ballast water flowing in from the out-

side for a ballast operation or performing a certain treatment of ballast water discharged into the outside for a de-ballast operation; a positional information receiving unit for receiving positional information; and a control unit for confirming a ship's position by using positional information received from the positional information receiving unit and then determining whether to operate the ballast water treatment unit during the ballast operation or during the de-ballast operation.

**[0008]** In a further embodiment, the control unit may further comprise a memory for storing a position to perform the ballast operation, and the control unit may store in the memory the position to perform the ballast operation during the ballast operation and, in consideration of a ballast operation performing area stored in the memory at the time of the ballast operation, may determine whether to operate the ballast water treatment unit.

**[0009]** In a further embodiment, an operational condition of the ballast water treatment unit required during the ballast operation or during the de-ballast operation may be stored in the memory, and the control unit may be configured to determine whether to operate the ballast water treatment unit according to the operational condition stored in the memory during the ballast operation or during the de-ballast operation.

**[0010]** In a further embodiment, if an updated operational condition of the ballast water treatment unit is inputted via the positional information receiving unit, the control unit may be configured to store the updated operational condition of the ballast water treatment unit in the memory.

**[0011]** In a further embodiment, the ballast water treatment unit may comprise an electrolysis unit for being capable of electrolyzing the ballast water flowing in from the outside during the ballast operation; and a neutralization unit for neutralizing residual oxidants remaining in ballast water discharged into the outside during the de-ballast operation, and the control unit may be configured to control the electrolysis unit by determining whether to operate the electrolysis unit during the ballast operation and may be also configured to control the neutralization unit by determining whether to operate the neutralization unit during the de-ballast operation.

**[0012]** In a further embodiment, the ballast water treatment unit may comprise an ultraviolet treatment unit for performing an ultraviolet sterilization treatment of ballast water flowing in from the outside during the ballast operation or of ballast water discharged into the outside during the de-ballast operation, and the control unit may be configured to control the ultraviolet treatment unit by determining whether to operate the ultraviolet treatment unit during a ballast operation and during a de-ballast operation.

**[0013]** So as to obtain the object described above, a ballast water treatment operating method according to another embodiment of the present invention may comprise the steps of: receiving a first positional information from a positional information receiving unit if a ballast

operating button is inputted via a user inputting unit; storing in a memory the first positional information received from the positional information receiving unit at the step of receiving the first positional information; confirming whether positional information as to a position to perform a de-ballast operation via the user inputting unit is inputted; and performing a certain treatment of ballast water flowing in from the outside by operating a ballast water treatment unit if the positional information inputted at the confirmation step satisfies an operational condition of the ballast water treatment unit.

**[0014]** In a further embodiment, the method may further comprise the steps of: receiving a second positional information from the positional information receiving unit if a de-ballast operating button is inputted via a user inputting unit; and performing a certain treatment of ballast water discharged into the outside by operating the ballast water treatment unit if an operational condition of the ballast water treatment unit is satisfied in consideration of the second positional information received from the positional information receiving unit at the second positional information receipt step and the first positional information stored in the memory.

**[0015]** According to the above configuration, the present invention can prevent a needless energy consumption by determining whether to operate a ballast water treatment based on positional information.

**[0016]** In addition, the present invention can determine whether to treat ballast water according to a deballasting operation performing area at the time of the deballasting operation.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0017]** The above and other objects, features and advantages of the present invention will become more apparent to those of ordinary skill in the art by describing in detail exemplary embodiments thereof with reference to the accompanying drawings, in which:

FIG. 1 illustrates schematically a block diagram of a ballast water treatment operating apparatus according to one embodiment of the present invention; FIG. 2 illustrates schematically a block diagram of a ballast water treatment operating apparatus according to another embodiment of the present invention; FIG. 3 is a flow chart of a ballast operation according to one embodiment of the present invention; and FIG. 4 is a flow chart of a deballast treatment operation according to another embodiment of the present invention.

## DESCRIPTION OF SPECIFIC EMBODIMENTS

**[0018]** Exemplary embodiments of a ballast water treatment operating apparatus and method according to the present invention will be described in detail below with reference to the accompanying drawings. For refer-

ence, in relation with the description of the present invention, as the terms indicating constituent elements of the present invention are named in consideration of the function of the respective constituent elements, they will not be understood as the meaning of limitation of technical constituent elements of the present invention.

**[0019]** FIG. 1 illustrates schematically a block diagram of a ballast water treatment operating apparatus according to one embodiment of the present invention.

**[0020]** As illustrated in FIG. 1, a ballast water treatment operating apparatus includes a pump 110 for intaking ballast water; a ballast water tank 135 for storing ballast water; and a first valve 121, a second valve 122, a third valve (ECU intake valve) 123, a fourth valve (ECU discharge valve), a fifth valve (bypass valve) 125, a sixth valve (tank discharge valve) 126, a seventh valve (tank intake valve) 127 and a eighth valve (deballast discharge valve) 128 for controlling the flow rate of ballast water.

**[0021]** In addition, the ballast water treatment operating apparatus includes a plurality of units related with a ballast water treatment. To this end, the ballast water treatment operating apparatus includes an electrolysis unit (ECU) 146 for electrolyzing ballast water; a neutralization unit 142 for neutralizing TRO remaining in ballast water discharged during a deballast operation; a TRO sensor unit 148 for measuring TRO remaining in ballast water during a ballast or deballast operation; a flow rate detection unit 144 for detecting a flow during a ballast or deballast operation; and a power supply unit 160 for supplying a power to the above units.

**[0022]** The term "TRO" used in this invention means the total residual oxidant existing in ballast water and is generally obtained by measuring a residual chlorine value of chlorine remained after chlorine generated via an electrolysis process oxidizes aquatic organisms within ballast water. In case seawater or salt water is electrolyzed or chlorine-sterilized, several kinds of oxidants co-exist as a result of replacement of active chlorines by atoms such as bromine. The TRO indicates all active oxidants existing at this time.

**[0023]** The ballast water treatment operating apparatus also includes a pump 110; a distribution board 150 for providing a state signal for each operation of a plurality of valves; a user inputting unit 170 operable to receive a user input; a positional information receiving unit 180 operable to communicate with a satellite; and a control unit 190 operable to communicate with and control the above units, wherein the control unit may comprise a personal computer and the like. Herein the state signal of each valve means a state information detected according to operation of the pump 110 or each valve. For example, in case a limit switch is provided at each valve, a state signal of each valve may be a state-on signal when the valve is open.

**[0024]** The positional information receiving unit 180 may include a GPS satellite communication module to receive positional information, and may also receive positional information directly from a user. The positional

information receiving unit 180 may receive an operational condition updated through communication with an artificial satellite in case the positional information receiving unit 180 is provided with a satellite communication module.

**[0025]** In the present invention the control unit 190 confirms a position as to a ship's latitude and longitude by using positional information received from the positional information receiving unit 180 when a ballast operation is to be performed. The control unit 190 performs a ballast operation without operating the electrolysis unit 146 if a ship's position is located in an area in which the electrolysis unit 146 does not need to be operated. However, the control unit 190 operates the electrolysis unit 146 during a ballast operation if a ship's position is located in an area in which the electrolysis unit 146 has to be operated.

**[0026]** In addition, the control unit 190 confirms a position as to a ship's latitude and longitude by using positional information received from the positional information receiving unit 180 when a deballast operation is to be performed. The control unit 190 performs a deballast operation without operating the neutralization unit 142 if a ship's position is located in an area in which the neutralization unit 142 does not need to be operated. However, the control unit 190 operates the neutralization unit 142 during a ballast operation if a ship's position is located in an area in which the neutralization unit 142 has to be operated.

**[0027]** To this end, the control unit 190 may further include a memory (not shown). In the memory are stored an operational condition as to whether to operate the electrolysis unit 146 during a ballast operation and an operational condition as to whether to operate the neutralization unit 142 necessary during a deballast operation.

**[0028]** Thus, the control unit 190 determines whether to operate the electrolysis unit 146 according to the operational condition stored in the memory when a ballast operation is to be performed and determines whether to operate the neutralization unit 142 according to the operational condition stored in the memory when a deballast operation is to be performed.

**[0029]** The condition by which the control unit 190 determines whether to perform an operation includes (1) whether the area where a ballast operation is performed is the same as that where a deballast operation is performed; (2) whether the area where a ballast or deballast operation is performed is under the Mutual Exemption Agreement and the like. During a ballast operation, the control unit 190 does not operate the electrolysis unit 146 if the area where a ballast operation is performed is the same as that where a deballast operation is performed or if the area where a ballast operation is performed is under the Mutual Exemption Agreement. In case the area where a ballast operation is performed is the same as that where a deballast operation is performed, there is no need to operate deliberately the electrolysis unit 146

during a ballast operation and also to operate deliberately the neutralization unit 142 during a deballast operation.

**[0030]** In addition, in case of agreeing that the application of 'the ballast water management convention' is exempted, like the areas under the Mutual Exemption Agreement, for example like Korea and Japan, there is also no need to operate deliberately the electrolysis unit 146 during a ballast operation and also to operate deliberately the neutralization unit 142 during a deballast operation.

**[0031]** Also, the control unit 190 may store in a memory an updated operational condition received at the positional information receiving unit 180.

**[0032]** FIG. 2 illustrates schematically a block diagram of a ballast water treatment operating apparatus according to another embodiment of the present invention.

**[0033]** As shown in FIG. 2, a ballast water treatment operating apparatus includes a pump 210 for intaking ballast water; a ballast water tank 235 for storing ballast water; and a first valve 221, a second valve 222, a third valve 223, a fourth valve 224 and a fifth valve 225 for controlling the flow rate of ballast water.

**[0034]** In addition, the ballast water treatment operating apparatus includes a plurality of units related with a ballast water treatment. To this end, the ballast water treatment operating apparatus includes a filter unit 240 for filtering detrimental substances, etc., of ballast water; an ultraviolet (UV) treatment unit 245 for performing UV treatment of ballast water; and a power supply unit 250 for supplying a power to the above units.

**[0035]** The ballast water treatment operating apparatus also includes a pump 210; a distribution board 260 for providing a state signal for each operation of a plurality of valves; a user inputting unit 270 operable to receive a user input; a positional information receiving unit 280 operable to communicate with a satellite; a control unit 290 operable to communicate with and control the above units, wherein the control unit may comprise a personal computer and the like. Herein the state signal of each valve means a state information detected according to operation of the pump 210 or each valve. For example, in case a limit switch is provided at each valve, a state signal of each valve may be a state-on signal when the valve is open.

**[0036]** The positional information receiving unit 280 may include a GPS satellite communication module to receive positional information, and may also receive positional information directly from a user. The positional information receiving unit 280 may receive an operational condition updated through communication with an artificial satellite in case the positional information receiving unit 180 is provided with a satellite communication module.

**[0037]** The positional information receiving unit 280 includes GPS which receives positional information. In addition, the positional information receiving unit 280 may receive an operational condition updated through communication with an artificial satellite.

**[0038]** In the present invention the control unit 290 confirms a position as to a ship's latitude and longitude by using positional information received from the positional information receiving unit 280 if a ballast operation is to be performed. The control unit 290 performs a ballast operation without operating an ultraviolet treatment unit 245 if a ship's position is located in an area in which the ultraviolet treatment unit 245 does not need to be operated. However, the control unit 290 operates the ultraviolet treatment unit 245 during a ballast operation if a ship's position is located in an area in which the ultraviolet treatment unit 245 has to be operated.

**[0039]** In addition, the control unit 290 confirms a position as to a ship's latitude and longitude by using positional information received from the positional information receiving unit 280 when a deballast operation is to be performed. The control unit 290 performs a deballast operation without operating the ultraviolet treatment unit 245 if a ship's position is located in an area in which the ultraviolet treatment unit 245 does not need to be operated. However, the control unit 290 operates the ultraviolet treatment unit 245 during a ballast operation if a ship's position is located in an area in which the ultraviolet treatment unit 245 has to be operated.

**[0040]** To this end, the control unit 290 may further include a memory (not shown). In the memory are stored an operational condition as to whether to operate the ultraviolet treatment unit 245 during a ballast operation and an operational condition as to whether to operate the ultraviolet treatment unit 245 necessary during a deballast operation.

**[0041]** Thus, the control unit 290 determines whether to operate the ultraviolet treatment unit 245 according to the operational condition stored in the memory when a ballast operation is to be performed and determines whether to operate the ultraviolet treatment unit 245 according to the operational condition stored in the memory when a deballast operation is to be performed.

**[0042]** In addition, the control unit 290 may store in a memory an updated operational condition received at the positional information receiving unit 280.

**[0043]** Meanwhile, the electrolysis unit, the neutralization unit or the ultraviolet treatment unit described in the above mentioned embodiments may be commonly called a ballast water treatment unit.

**[0044]** FIG. 3 is a flow chart of a ballast operation according to one embodiment of the present invention.

**[0045]** A crew may input a ballast operation instruction into a control unit 190 by pressing a ballast button (not shown) of a user inputting unit 170 when the crew is to proceed with a ballast operation (S302).

**[0046]** If the ballast operation instruction is inputted, in an embodiment of FIG. 1, first the control unit 190 controls a drive unit (not shown) such that a first valve 121, a second valve 122, a third valve 123, a fourth valve 124 and a seventh valve 127 are opened (S304). Thus the first valve 121, the second valve 122, the third valve 123, the fourth valve 124 and the seventh valve 127 may be

operated to be opened, and a first valve state-on signal, a second valve state-on signal, a third valve state-on signal, a fourth valve state-on signal and a seventh valve state-on signal may be provided to a distribution board 160. In addition, a fifth valve state-off signal, a sixth valve state-off signal and an eighth valve state-off signal may also be provided to the distribution board 160.

**[0047]** Next, the control unit 190 may control the drive unit to operate a pump 110 (S306). According to an operation of the pump 110, a pump state-on signal may be provided to the distribution board 160.

**[0048]** As described above, all signal from the pump 110 or each valve have to be connected to the distribution board 160 so as to provide the distribution board 160 with a pump state signal and all valve state signals but this increases the cost. Therefore, it is preferable to provide the distribution board with some signals only necessary for a ballast operation and a deballast operation.

**[0049]** The control unit 190 may be configured to detect a flow rate of ballast water via a flow rate detection unit 144 if the pump 110 is operated (S308). The control unit 190 may determine that ballast water is flowing if a flow rate value obtained from the flow rate detection unit 144 is greater than or equal to a defined standard flow rate value, for example 500m<sup>3</sup>/h.

**[0050]** The control unit 190 receives positional information from the positional information receiving unit 180 (S310). The control unit 190 store in a memory positional information of a ship which is to perform a ballast operation (S312).

**[0051]** The control unit 190 checks whether a user selects a position to perform a deballast operation by manipulating a user inputting unit 170 (S314). The control unit 190 operates a ballast water treatment unit, that is the electrolysis unit 146 or the ultraviolet treatment unit 245 if a user does not select a position to perform a deballast operation (S320). Meanwhile, the control unit 190 may adjust a current supplied to the electrolysis unit 146 depending on a flow rate of ballast water detected by the flow rate detection unit 144. The control unit 190 may also measure a flow rate of ballast water by the flow rate detection unit 144 and control a current supplied to the electrolysis unit 146 such that a proper amount of TRO is generated by measuring TRO by the TRO sensor unit 148. The control unit 190 may control a flow rate of ballast water by controlling the pump 110 as necessary.

**[0052]** The control unit 190 may be configured to store a deballast position if a position to perform a deballast operation is selected by a user (S316). The control unit 190 checks whether to be the unoperation condition of a ballast treatment (S318). The control unit 190 operates a ballast water treatment unit, that is to say the electrolysis unit 146 or the ultraviolet treatment unit 245 if not being an unoperation condition of a ballast treatment (S320). The control unit 190 also performs a ballast operation without operating a ballast water treatment unit, that is the electrolysis unit 146 or the ultraviolet treatment unit 245 if an unoperation condition of a ballast treatment

is satisfied (S322).

**[0053]** The control unit 190 may in particular stop operating the electrolysis unit 146 or the ultraviolet treatment unit 245 if a flow rate of ballast water is not detected at the flow rate detection unit 144 because the ballast water tank 135 is completely filled with ballast water.

**[0054]** FIG. 4 is a flow chart of a deballast treatment operation according to another embodiment of the present invention.

**[0055]** A crew may input a deballast operation instruction into a control unit 190 by pressing a deballast button (not shown) of a user inputting unit 170 when the crew is to proceed with a deballast operation (S402).

**[0056]** If the ballast operation instruction is inputted, in an embodiment of FIG. 1, first the control unit 190 controls a drive unit (not shown) such that a second valve 122, a fifth valve 125, a sixth valve 126 and a eighth valve 128 are opened (S404). Thus the second valve 122, the fifth valve 125, the sixth valve 126 and the eighth valve 128 may be operated to be opened, and a second valve state-on signal, a fifth valve state-on signal, a sixth valve state-on signal and a eighth valve state-on signal may be provided for a distribution board 160. In addition, a first valve state-off signal, a third valve state-off signal, a fourth valve state-off signal and a seventh valve state-off signal may also be provided to the distribution board 160.

**[0057]** Next, the control unit may control the drive unit to operate the pump 110 (S406). According to an operation of the pump 110, a pump state-on signal may be provided to the distribution board 160.

**[0058]** The control unit 190 detects a flow rate of ballast water via a flow rate detection unit 144 if the pump 110 is operated (S408).

**[0059]** The control unit 190 receives positional information from the positional information receiving unit 180 (S410). The control unit 190 store in a memory positional information of a ship which is to perform a deballast operation (S412).

**[0060]** The control unit 190 checks whether to be an unoperation condition of a deballast treatment (S414). The control unit 190 operates a ballast water treatment unit, that is to say the neutralization unit 142 or the ultraviolet treatment unit 245 if not being an unoperation condition of a deballast treatment (S416), and performs a deballast operation without operating a ballast water treatment unit, that is to say the neutralization unit 142 or the ultraviolet treatment unit 245 if an unoperation condition of a deballast treatment is satisfied (S418).

**[0061]** The control unit 190 may in particular stop operating the neutralization unit 142 or the ultraviolet treatment unit 245 if a flow rate of ballast water is not detected at the flow rate detection unit 144 because the ballast water tank 135 is completely empty of ballast water.

**[0062]** The ballast water treatment operating apparatus may include a stride operation, a gravity ballast operation and a gravity deballast operation and the like, other than the above mentioned operation conditions and may also be provided with a selection switch manually

operable by the manipulation of a crew. In addition, the ballast water treatment operating apparatus may store a log such as operation records, that is to say a flow rate and a treatment concentration.

**[0063]** Embodiments of the present invention described above are simply illustrative of the technical concept of the present invention and the protective scope of the present invention should be interpreted by the appended claims. In addition, it will be apparent to those skilled in the art that various modifications and alterations can be made without departing from the essential features of the present invention. Thus, all technical concepts within the equivalent scope to the present invention should be interpreted to be included within the protective scope of the present invention.

## Claims

1. A ballast water treatment operating apparatus comprising:

a ballast water treatment unit for performing a certain treatment of a ballast water flowing in from the outside for a ballast operation or performing a certain treatment of ballast water discharged into the outside for a de-ballast operation;

a positional information receiving unit (180, 280) for receiving a positional information; and  
a control unit (190, 290) for confirming a ship's position by using the positional information received from the positional information receiving unit (180, 280) and then determining whether to operate the ballast water treatment unit during the ballast operation or during the de-ballast operation;

wherein the control unit (190, 290) does not operate the ballast water treatment unit when the area where the ballast operation is performed is the same as the area where the de-ballast operation is performed or the area where the ballast operation or de-ballast operation is performed is under a Mutual Exemption Agreement stating that an application of a Ballast Water Management Convention is mutually exempted.

2. The ballast water operating apparatus of claim 1, wherein the control unit (190, 290) comprises a memory for storing a position to perform the ballast operation, and wherein the control unit (190, 290) stores in the memory the position to perform the ballast operation during the ballast operation and, in consideration of a ballast operation performing area stored in the memory at the time of the ballast operation, determines whether to operate the ballast water treatment unit.

3. The ballast water operating apparatus of claim 2, wherein an operational condition of the ballast water treatment unit required during the ballast operation or during the de-ballast operation is stored in the memory, and wherein the control unit (190, 290) is configured to determine whether to operate the ballast water treatment unit according to the operational condition stored in the memory during the ballast operation or during the de-ballast operation. 5
4. The ballast water treatment operating apparatus of claim 3, wherein if an updated operational condition of the ballast water treatment unit is inputted via the positional information receiving unit (180, 280), the control unit (190, 290) is configured to store the updated operational condition of the ballast water treatment unit in the memory. 10
5. The ballast water treatment operating apparatus of any one of claims 1 to 4, wherein the ballast water treatment unit comprises an electrolysis unit (146) for being capable of electrolyzing the ballast water flowing in from the outside during the ballast operation; and a neutralization unit (142) for neutralizing residual oxidants remaining in ballast water discharged into the outside during the de-ballast operation, and wherein the control unit (190, 290) is configured to control the electrolysis unit (146) by determining whether to operate the electrolysis unit (146) during the ballast operation and is also configured to control the neutralization unit (142) by determining whether to operate the neutralization unit (142) during the de-ballast operation. 15
6. The ballast water treatment operating apparatus of any one of claims 1 to 4, wherein the ballast water treatment unit comprises an ultraviolet treatment unit (245) for performing an ultraviolet sterilization treatment of ballast water flowing in from the outside during the ballast operation or of ballast water discharged into the outside during the de-ballast operation, and wherein the control unit (190, 290) is configured to control the ultraviolet treatment unit (245) by determining whether to operate the ultraviolet treatment unit (245) during a ballast operation and during a de-ballast operation. 20
7. A ballast water treatment operating method for the ballast water treatment operating apparatus of claim 1, the method comprising the steps of: 25
- receiving a first positional information from a positional information receiving unit (180, 280) if a ballast operating button is inputted via a user inputting unit; 30
- confirming whether a second positional information

tion as to a position to perform a de-ballast operation via the user inputting unit is inputted; determining whether the area where the ballast operation is performed is the same as the area where the de-ballast operation is performed or the area where the ballast operation and de-ballast operation are performed is under a Mutual Exemption Agreement stating that an application of a Ballast Water Management Convention is mutually exempted by using the first position information received in the receiving step and the second position information confirmed in the confirming step; and not operating a ballast water treatment unit so as not to perform a predetermined process on the ballast water flowing from in the outside when the area where the ballast operation is performed is the same as the area where the de-ballast operation is performed and the area where the ballast operation or de-ballast operation is performed is under the Mutual Exemption Agreement. 35

8. The method of claim 7, further comprising the steps of:

receiving a second positional information from the positional information receiving unit (180, 280) if a de-ballast operating button is inputted via a user inputting unit; and performing a certain treatment of ballast water discharged into the outside by operating the ballast water treatment unit if an operational condition of the ballast water treatment unit is satisfied in consideration of the second positional information received from the positional information receiving unit (180, 280) at the second positional information receipt step and the first positional information stored in the memory. 40

## Patentansprüche

1. Betriebsvorrichtung für eine Ballastwasserbehandlung mit einer Ballastwasserbehandlungseinheit für die Durchführung einer bestimmten Behandlung von Ballastwasser, das für einen Ballastzufuhrvorgang von außerhalb nach drinnen fließt, oder für die Durchführung einer bestimmten Behandlung von Ballastwasser, das für einen Ballastentsorgungsvorgang nach außerhalb abgeführt wird, einer Empfangseinheit für Positionsangaben (180, 280) zum Empfangen einer Positionsangabe und einer Steuereinheit (190, 290) zum Bestätigen einer Schiffsposition unter Verwendung der von der Empfangseinheit für Positionsangaben (180, 280) erhaltenen Positionsangabe und zur anschließenden Be-

stimmung, ob die Ballastwasserbehandlungseinheit während des Ballastzufuhrvorgangs oder während des Ballastentsorgungsvorgangs betrieben werden soll,

**dadurch gekennzeichnet, daß** die Steuereinheit (190, 290) die Ballastwasserbehandlungseinheit nicht betreibt, wenn das Gebiet, in dem der Ballastzufuhrvorgang durchgeführt wird, das gleiche ist wie das Gebiet, in dem der Ballastentsorgungsvorgang durchgeführt wird, oder wenn das Gebiet, in dem der Ballastzufuhrvorgang oder der Ballastentsorgungsvorgang durchgeführt wird, einer Gegenseitigen Ausnahmeübereinkunft unterliegt, in der festgelegt ist, daß eine Anwendung eines Ballastwassermanagementabkommens gegenseitig nicht erfolgt.

2. Betriebsvorrichtung für eine Ballastwasserbehandlung gemäß Anspruch 1, **dadurch gekennzeichnet, daß** die Steuereinheit (190, 290) einen Speicher zum Speichern einer Position zum Durchführen des Ballastzufuhrvorgangs aufweist und daß die Steuereinheit (190, 290) während des Ballastzufuhrvorgangs die Position zum Durchführen des Ballastzufuhrvorgangs im Speicher speichert und unter Berücksichtigung eines während des Ballastzufuhrvorgangs im Speicher gespeicherten Gebiets zum Durchführen eines Ballastzufuhrvorgangs bestimmt, ob die Ballastwasserbehandlungseinheit betrieben werden soll.

3. Betriebsvorrichtung für eine Ballastwasserbehandlung gemäß Anspruch 2, **dadurch gekennzeichnet, daß** eine während des Ballastwasserzufuhrvorgangs oder während des Ballastwasserentsorgungsvorgangs geforderte Betriebsbedingung der Ballastwasserbehandlungseinheit im Speicher gespeichert ist und daß die Steuereinheit (190, 290) dazu ausgelegt ist, zu bestimmen, ob die Ballastwasserbehandlungseinheit während des Ballastwasserzufuhrvorgangs oder während des Ballastwasserentsorgungsvorgangs gemäß der im Speicher gespeicherten Betriebsbedingung betrieben werden soll.

4. Betriebsvorrichtung für eine Ballastwasserbehandlung gemäß Anspruch 3, **dadurch gekennzeichnet, daß** die Steuereinheit (190, 290) dazu ausgelegt ist, wenn eine auf den neuesten Stand gebrachte Betriebsbedingung der Ballastwasserbehandlungseinheit über die Empfangseinheit für Positionsangaben (180, 280) eingegeben worden ist, die auf den neuesten Stand gebrachte Betriebsbedingung der Ballastwasserbehandlungseinheit im Speicher zu speichern.

5. Betriebsvorrichtung für eine Ballastwasserbehandlung gemäß einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, daß** die Ballastwasserbehand-

lungseinheit eine Elektrolyseeinheit (146) aufweist, um in der Lage zu sein, das während des Ballastzufuhrvorgangs von außerhalb nach drinnen fließende Ballastwasser zu elektrolysieren, und eine Neutralisierungseinheit (142) aufweist, um im während des Ballastentsorgungsvorgangs nach außerhalb fließenden Ballastwasser verbliebene restliche Oxidationsmittel zu neutralisieren, und

**dadurch gekennzeichnet, daß** die Steuereinheit (190, 290) dazu ausgelegt ist, die Elektrolyseeinheit (146) zu steuern, in dem sie bestimmt, ob die Elektrolyseeinheit (146) während des Ballastwasserzufuhrvorgangs betrieben werden soll, und daß sie auch dazu ausgelegt ist, die Neutralisierungseinheit (142) zu steuern, in dem sie bestimmt, ob die Neutralisierungseinheit (142) während des Ballastwasserentsorgungsvorgangs betrieben werden soll.

6. Betriebsvorrichtung für eine Ballastwasserbehandlung gemäß einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, daß** die Ballastwasserbehandlungseinheit eine Ultraviolett-Behandlungseinheit (245) aufweist, um eine Ultraviolett-Sterilisierungsbildung von während des Ballastwasserzufuhrvorgangs von außerhalb nach drinnen fließendem Ballastwasser oder von während des Ballastentsorgungsvorgangs nach außerhalb fließendem Ballastwasser durchzuführen, und daß die Steuereinheit (190, 290) dazu ausgelegt ist, die Ultraviolett-Behandlungseinheit (245) zu steuern, in dem sie bestimmt, ob die Ultraviolett-Behandlungseinheit (245) während eines Ballastwasserzufuhrvorgangs oder eines Ballastwasserentsorgungsvorgangs betrieben werden soll.

7. Betriebsverfahren für eine Ballastwasserbehandlung für die Betriebsvorrichtung für eine Ballastwasserbehandlung gemäß Anspruch 1, wobei das Verfahren die folgenden Schritte aufweist:

Empfangen einer ersten Positionsangabe von einer Empfangseinheit für Positionsangaben (180, 280), wenn ein Ballastzufuhrbefehl über eine Nutzereingabeeinheit eingegeben worden ist,

Bestätigen, ob eine zweite Positionsangabe bezüglich einer Position für das Durchführen einer Ballastentsorgung über die Nutzereingabeeinheit eingegeben worden ist,

Bestimmen unter Verwendung der im Empfangsschritt erhaltenen ersten Positionsangabe und der im Bestätigungsschritt erhaltenen zweiten Positionsangabe, ob das Gebiet, in dem der Ballastzufuhrvorgang durchgeführt wird, das gleiche ist wie das Gebiet, in dem der Ballastentsorgungsvorgang durchgeführt wird, oder ob das Gebiet, in dem der Ballastzufuhrvorgang und der Ballastentsorgungsvorgang durchge-



führt werden, einer Gegenseitigen Ausnahme-  
 übereinkunft unterliegt, in der festgelegt ist, daß  
 eine Anwendung eines Ballastwassermanage-  
 mentabkommens gegenseitig nicht erfolgt, und  
 Nichtbetreiben einer Ballastwasserbehand-  
 lungseinheit, um eine vorbestimmte Behand-  
 lung nicht auf das von draußen nach innen flie-  
 ßende Ballastwasser anzuwenden, wenn das  
 Gebiet, in dem der Ballastzufuhrvorgang durch-  
 geführt wird, das gleiche ist wie das Gebiet, in  
 dem der Ballastentsorgungsvorgang durchge-  
 führt wird, und wenn das Gebiet, in dem der Bal-  
 lastzufuhrvorgang oder der Ballastentsorgungs-  
 vorgang durchgeführt wird, einer Gegenseitigen  
 Ausnahmeübereinkunft unterliegt.

#### 8. Verfahren gemäß Anspruch 7, mit den weiteren Schritten:

Empfangen einer zweiten Positionsangabe von  
 der Empfangseinheit für Positionsangaben  
 (180, 280), wenn ein Ballastentsorgungsbefehl  
 über eine Nutzereingabeeinheit eingegeben  
 worden ist, und  
 Durchführen einer bestimmten Behandlung von  
 Ballastwasser, das nach außerhalb entsorgt  
 wird, durch Betreiben der Ballastwasserbe-  
 handlungseinheit, wenn eine Betriebsbedin-  
 gung der Ballastwasserbehandlungseinheit un-  
 ter Berücksichtigung der im Schritt des Empfan-  
 gens einer zweiten Positionsangabe von der  
 Empfangseinheit für Positionsangaben (180,  
 280) erhaltenen zweiten Positionsangabe und  
 der im Speicher gespeicherten ersten Position-  
 angabe erfüllt ist.

#### Revendications

##### 1. Appareil de commande de traitement d'eau de bal- last comprenant :

une unité de traitement d'eau de ballast destinée  
 à réaliser un certain traitement d'une eau de bal-  
 last provenant de l'extérieur pour une opération  
 de ballastage ou à réaliser un certain traitement  
 de l'eau de ballaste déchargée vers l'extérieur  
 pour une opération de déballastage ;  
 une unité de réception d'informations de posi-  
 tion (180, 280) destinée à recevoir des informa-  
 tions de position ; et  
 une unité de commande (190, 290) destinée à  
 confirmer la position d'un navire en utilisant les  
 informations de position reçues de l'unité de ré-  
 ception d'informations de position (180, 280),  
 puis à déterminer s'il faut ou non actionner l'unité  
 de traitement d'eau de ballast pendant l'opéra-  
 tion de ballastage ou pendant l'opération de

déballastage ;

l'unité de commande (190, 290) n'actionnant  
 pas l'unité de traitement d'eau de ballast lorsque  
 la zone dans laquelle l'opération de ballast est  
 réalisée est la même que la zone dans laquelle  
 l'opération de déballastage est réalisée ou lors-  
 que la zone dans laquelle l'opération de ballas-  
 tage ou l'opération de déballastage est réalisée  
 se trouve sous Accord d'Exemption Mutuelle  
 établissant qu'une application d'une Convention  
 de Gestion des Eaux de Ballast fait l'objet d'une  
 exemption mutuelle.

2. Appareil de commande de traitement d'eau de bal-  
 last selon la revendication 1, dans lequel l'unité de  
 commande (190, 290) comprend une mémoire des-  
 tinée à stocker une position pour la réalisation de  
 l'opération de ballastage, et dans lequel l'unité de  
 commande (190, 290) stocke dans la mémoire la  
 position pour la réalisation de l'opération de ballas-  
 tage pendant l'opération de ballastage et, en consi-  
 dération d'une zone de réalisation d'opération de  
 ballastage stockée dans la mémoire au moment de  
 l'opération de ballastage, détermine s'il faut ou non  
 actionner l'unité de traitement d'eau de ballast.

3. Appareil de commande de traitement d'eau de bal-  
 last selon la revendication 2, dans lequel une con-  
 dition de fonctionnement de l'unité de traitement  
 d'eau de ballast requise pendant l'opération de bal-  
 lastage ou pendant l'opération de déballastage est  
 stockée dans la mémoire, et dans lequel l'unité de  
 commande (190, 290) est configurée pour détermi-  
 ner s'il faut ou non actionner l'unité de traitement  
 d'eau de ballast selon la condition de fonctionnement  
 stockée dans la mémoire pendant l'opération de bal-  
 lastage ou pendant l'opération de déballastage.

4. Appareil de commande de traitement d'eau de bal-  
 last selon la revendication 3, dans lequel, si une con-  
 dition de fonctionnement mise à jour de l'unité de  
 traitement d'eau de ballast est introduite via l'unité  
 de réception d'informations de position (180, 280),  
 l'unité de commande (190, 290) est configurée pour  
 stocker dans la mémoire la condition de fonctionne-  
 ment mise à jour de l'unité de traitement d'eau de  
 ballast.

5. Appareil de commande de traitement d'eau de bal-  
 last selon l'une quelconque des revendications 1 à  
 4, dans lequel l'unité de traitement d'eau de ballast  
 comprend une unité d'électrolyse (146) destinée à  
 pouvoir électrolyser l'eau de ballast provenant de  
 l'extérieur pendant l'opération de ballastage ; et une  
 unité de neutralisation (142) destinée à neutraliser  
 des oxydants résiduels restant dans l'eau de ballast  
 déchargée vers l'extérieur pendant l'opération de  
 déballastage, et

l'unité de commande (190, 290) étant configurée pour commander l'unité d'électrolyse (146) en déterminant s'il faut ou non actionner l'unité d'électrolyte (146) pendant l'opération de ballastage et étant également configurée pour commander l'unité de neutralisation (142) en déterminant s'il faut ou non actionner l'unité de neutralisation (142) pendant l'opération déballastage.

6. Appareil de commande de traitement d'eau de ballast selon l'une quelconque des revendications 1 à 4, dans lequel l'unité de traitement d'eau de ballast comprend une unité de traitement par ultraviolets (245) destinée à réaliser un traitement de stérilisation par ultraviolets de l'eau de ballast provenant de l'extérieur pendant l'opération de ballastage ou de l'eau de ballast déchargée vers l'extérieur pendant l'opération de déballastage, et l'unité de commande (190, 290) étant configurée pour commander l'unité de traitement par ultraviolets (245) en déterminant s'il faut ou non actionner l'unité de traitement par ultraviolets (245) pendant une opération de ballastage et pendant une opération de déballastage.
7. Procédé de commande de traitement d'eau de ballast pour l'appareil de commande de traitement d'eau de ballast selon la revendication 1, le procédé comprenant les étapes de :

réception de premières informations de position en provenance d'une unité de réception d'informations de position (180, 280) si un bouton d'actionnement de ballastage est actionné via une unité d'interface utilisateur ;  
confirmation du fait que des deuxièmes informations de position concernant une position pour la réalisation d'une opération de ballastage ont ou non été introduites via l'unité d'interface utilisateur ;  
détermination du fait que la zone dans laquelle l'opération de ballastage est réalisée est ou non la même que la zone dans laquelle l'opération de déballastage est réalisée ou du fait que la zone dans laquelle l'opération de ballastage et l'opération de déballastage sont réalisées se trouve ou non sous Accord d'Exemption Mutuelle établissant qu'une application d'une Convention de Gestion des Eaux de Ballast fait l'objet d'une exemption mutuelle, en utilisant les premières informations de position reçues à l'étape de réception et les deuxièmes informations de position confirmées à l'étape de confirmation ; et  
non actionnement d'une unité de traitement d'eau de ballast de façon à ne pas réaliser un traitement prédéterminé sur l'eau de ballast provenant de l'extérieur lorsque la zone dans laquelle l'opération de ballast est réalisée est la

même que la zone dans laquelle l'opération de déballastage est réalisée et lorsque la zone dans laquelle l'opération de ballastage ou l'opération de déballastage est réalisée se trouve sous Accord d'Exemption Mutuelle.

8. Procédé selon la revendication 7, comprenant en outre les étapes de :

réception de deuxièmes informations de position en provenance de l'unité de réception d'informations de position (180, 280) si un bouton d'actionnement de déballastage est actionné via une unité d'interface utilisateur ; et  
réalisation d'un certain traitement de l'eau de ballast déchargée vers l'extérieur par actionnement de l'unité de traitement d'eau de ballast si une condition de fonctionnement de l'unité de traitement d'eau de ballast est satisfaite en considération des deuxièmes informations de position reçues de l'unité de réception d'informations de position (180, 280) à l'étape de réception de deuxièmes informations de position et des premières informations de position stockées dans la mémoire.

Fig. 1

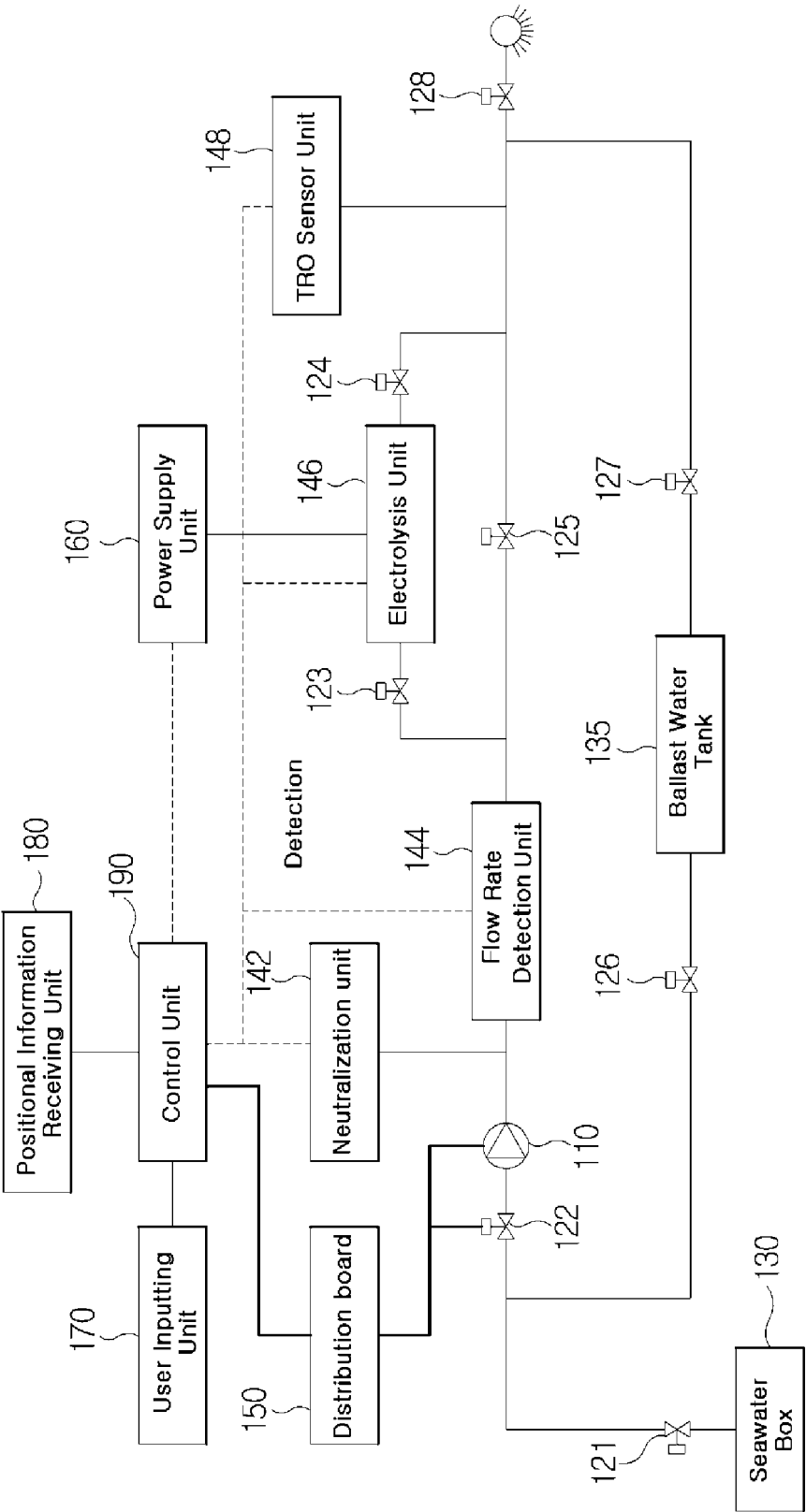


Fig. 2

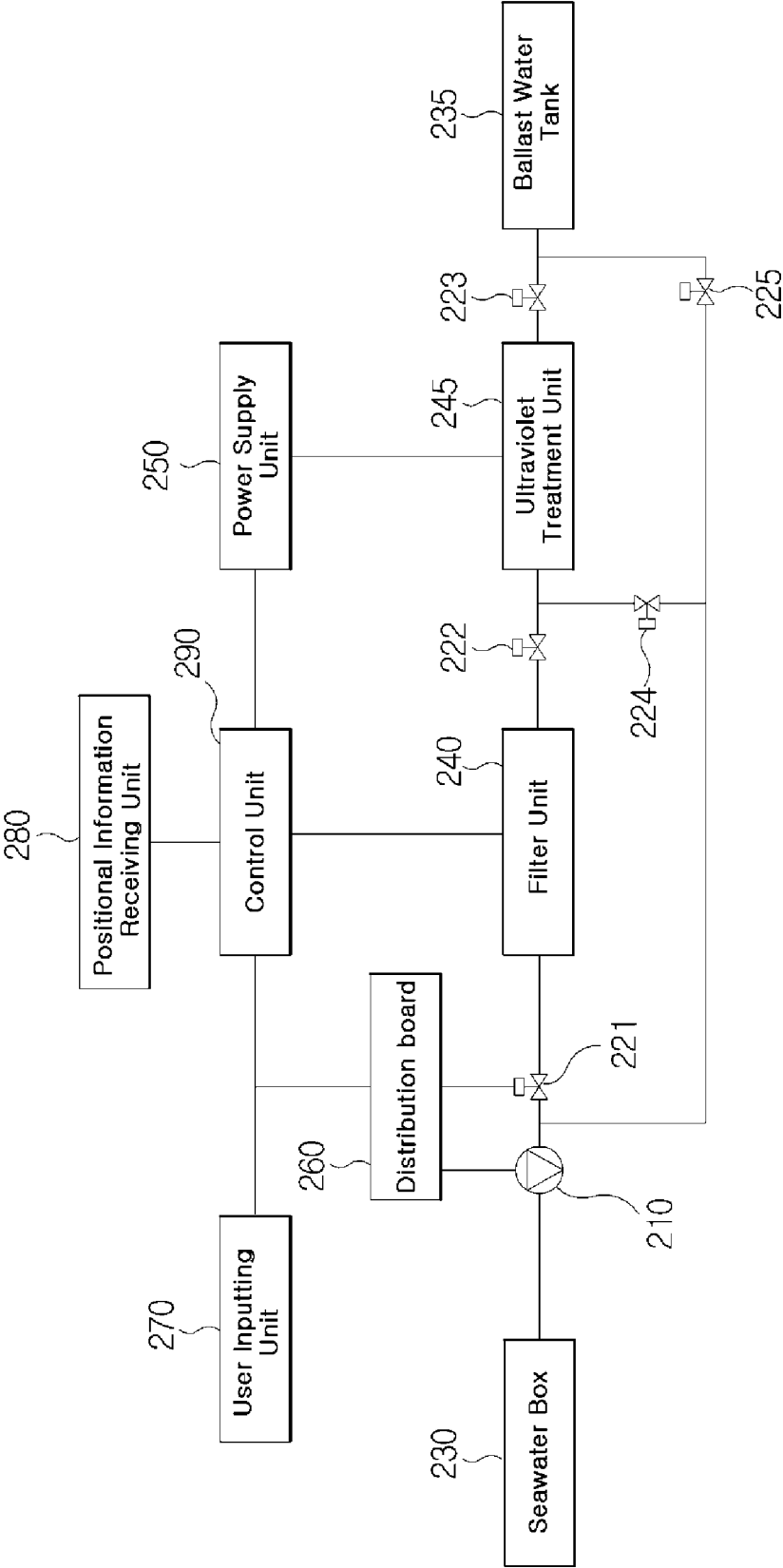


Fig. 3

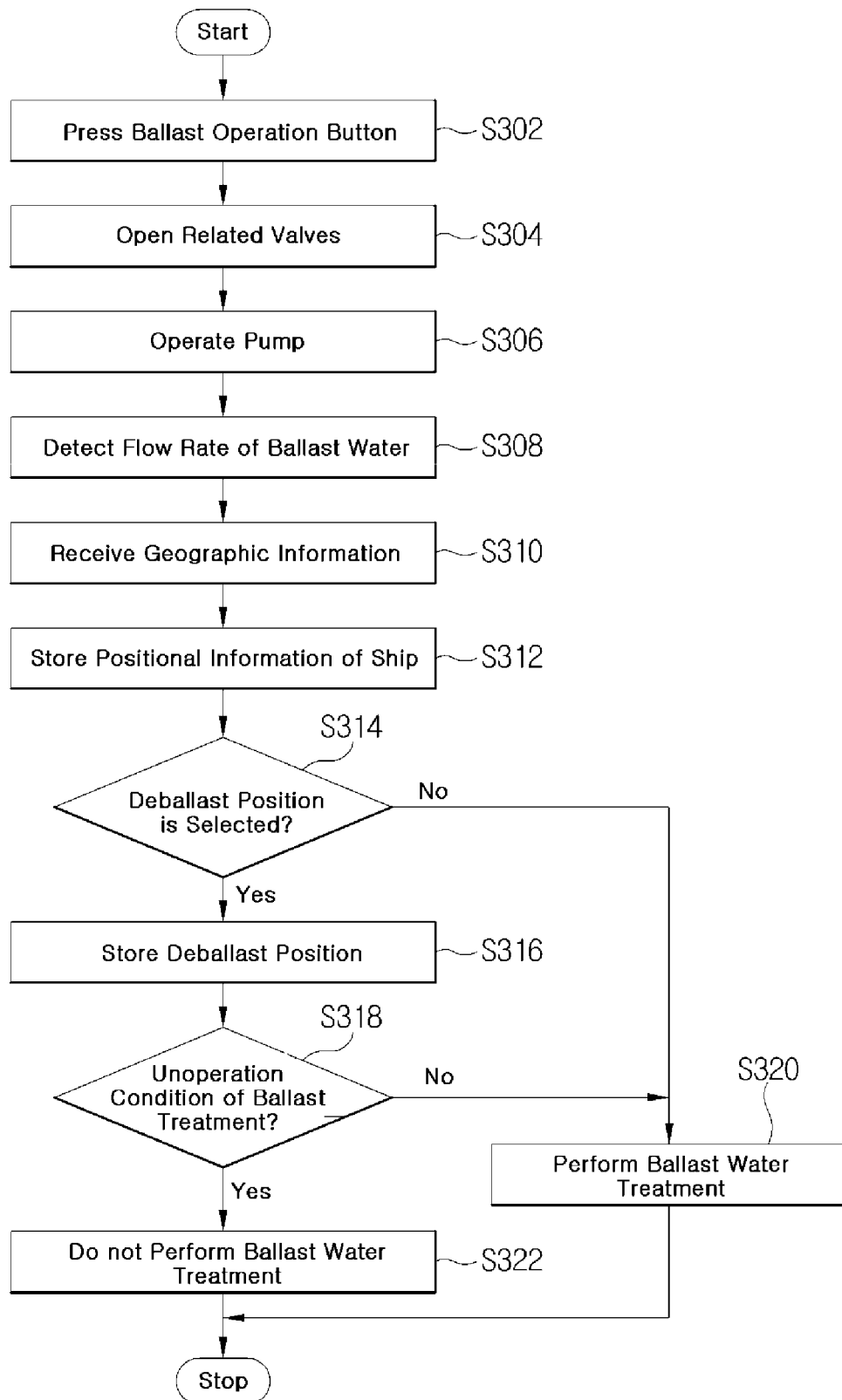
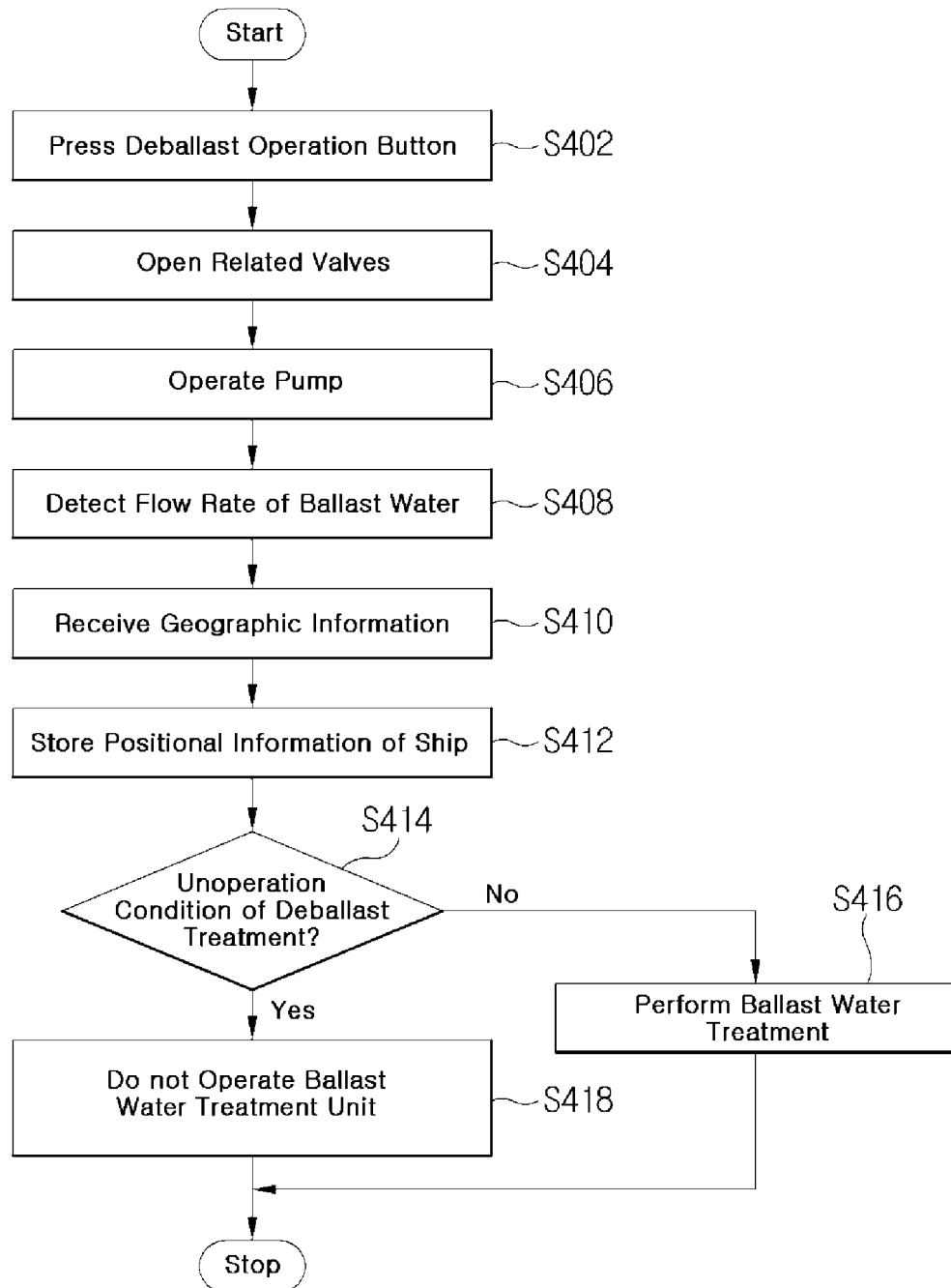


Fig. 4



**REFERENCES CITED IN THE DESCRIPTION**

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